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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/046,265	01/16/2002	Masahiro Ono	56937-04	3548
7590 03/02/2004 McDERMOTT, WILL & EMERY 600 13th Street, N.W. Washington, DC 20005-3096			EXAMINER GEYER, SCOTT B	
			ART UNIT 2829	PAPER NUMBER

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/046,265

Applicant(s)

ONO ET AL.

Examiner

Scott B. Geyer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 16-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6 and 7 is/are rejected.
- 7) ☒ Claim(s) 2,5 and 8-15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. The rejection of the previous office action has been overcome by applicant's perfection of the priority document. Accordingly, the new rejection below, which cites new references, is non-final.

#### ***Priority***

2. Receipt is acknowledged of the English translation of the foreign priority document JP 2001-011165; the claim of priority having been perfected to January 19, 2001.

#### ***Drawings / Specification***

3. The amendments to the drawings and specification submitted by the applicant are acceptable to overcome the objections noted in the previous office action.

#### ***Claim Rejections - 35 USC § 103***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oikawa et al. (Journal Of Lightwave Technology) in view of Frederiksen (4,136,357).

**5A.** As to **claim 1**, Oikawa et al. teach a photo-semiconductor module comprising a circuit board (preamp. IC) and a light receiving semiconductor device (flip-chip photodiode), as shown in figure 1. Also, as shown in figure 1, Oikawa et al. teach

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an optical fiber (input fiber) fixed to the semiconductor module. Oikawa et al. do not teach the optical fiber fixed to a mounting face of the light receiving photo-semiconductor device, or fixed to a back face of the light receiving photo-semiconductor device. However, Frederiksen teach a photo-semiconductor module in figure 1 wherein a light pipe 12 is fixed to the module wherein the light pipe 12 is fixed to the face of the light receiving semiconductor device 18. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the fiber optic cable/photo-semiconductor module of Oikawa et al. with Frederiksen so as to provide a direct and unhindered path between the light receiving device and the fiber optic cable which directs the light to the device.

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**6.** Claims 3, 4, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oikawa et al. (Journal Of Lightwave Technology) and Frederiksen (4,136,357) as applied to claim 1 above, and further in view of Omoya et al. (5,641,996).

**6A.** As to **claim 3**, Oikawa et al. and Frederiksen teach all of the claimed limitations as noted above except for the circuit board having connection electrodes, and connecting the protruding electrodes of the flip-chip to the circuit board with a conductive adhesive. However, Omoya et al. teach a flip-chip package in which the circuit board has connections (5), and the bump electrodes (3) are adhered to the circuit board (6) with conductive adhesive (4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the fiber optic cable/photo-semiconductor module of Oikawa et al. and Frederiksen with a flip-chip structure

utilizing a conductive adhesive and a circuit board having connection terminals so as to provide a complete pathway for electrical flow between the substrate and the chip.

**6B.** As to **claim 4**, Oikawa et al. and Frederiksen teach all of the claimed limitations as noted above and Frederiksen also teaches encapsulating. Neither Oikawa et al. nor Frederiksen teach encapsulating a *flip-chip* structure such that the surroundings between the terminal electrodes and connection electrodes are encapsulated with encapsulating resin. However, Omoya et al. teach encapsulating the flip-chip structure, as seen in figure 1, such that the connection and terminal electrodes are encapsulated. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the fiber optic cable/photo-semiconductor module of Oikawa et al. and Frederiksen with a flip-chip structure encapsulated as taught by Omoya et al. so as to protect the electrical connection between the chip and the substrate from deteriorating environmental effects.

**6C.** As to **claim 6**, it is notoriously well known in the art of semiconductor manufacturing to use solder as connections for flip-chip structures. For example, Omoya et al. teach connection electrodes made of solder (see figure 8, numeral 8).

**6D.** As to **claim 7**, Omoya et al. teach encapsulating electrical connections , as detailed above for claim 4.

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***Allowable Subject Matter***

7. Claims 2, 9 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Reasons for finding allowable subject matter in claims 2, 9 and 12 were established in the previous office action (mailed on 8-21-03). Claims 10, 11 and 13-15 are dependent upon claims 9 and 12.

8. Claims 5 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan, the instant invention regarding an opposing portion between the flip-chip device and the circuit board encapsulated with an encapsulating resin, *except* for the connection, as recited in claim 5 or 8.

9. The following reference is cited as being related to applicant's disclosure: Jayaraj et al. (6,320,257 B1).

***Conclusion***

10. This office action is **non-final**.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (571) 272-1958. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. E-mail: [scott.geyer@uspto.gov](mailto:scott.geyer@uspto.gov)

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SBG  
February 18, 2004

*David A. Zamecke*  
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Primary Examiner  
AU2827  
2/20/04